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MULTICOMPONENT DEPOSITS WITH BY-PRODUCT AS THE MAIN SOURCE OF FELDSPAR RAW MATERIALS FOR MODERN TECHNOLOGIES

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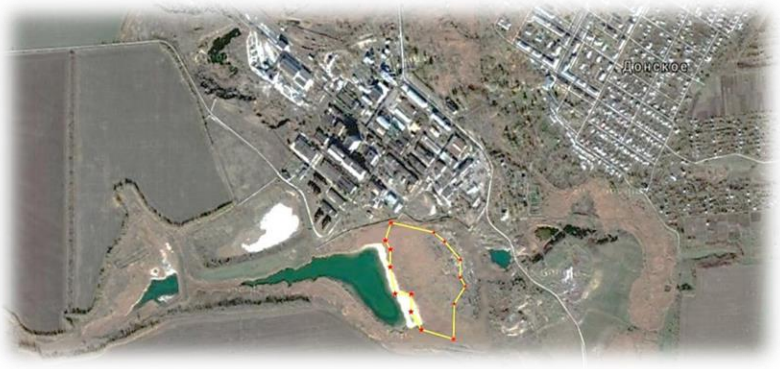

Introduction

Feldspar is raw materials with a growing volume of production every year, as well as a price for it. Feldspar consumption has been gradually increasing in ceramics, glass industry for solar panels, housing, and building construction.

Feldspars deposits are divided into three main groups: potassium feldspars - (orthoclase, microclines) $K_2OAl_2O_3{\times}6SiO_2$, sodium feldspars - (albites) $Na_2OAl_2O_3{\times}6SiO_2$ and calcium feldspars - (anortites) $CaOAl_2O_3{\times}2SiO_2$, which are present to varying degrees in all crystalline rocks. Potassium feldspar is the primary rock-forming mineral of many igneous metamorphic and sedimentary rocks. In addition to the main groups, there are other feldspars, such as barium feldspar – $BaOAl_2O_3{\times}2SiO_2$ (celsian), but they are rarely used in ceramics. The primary parameter that characterizes feldspar concentrates is the potassium modulus (ratio K_2O:Na_2O).

Each type of feldspar has its field of industrial application:

- potassium feldspars (orthoclase, microcline, sanidine) are used in the electroceramic, electrode, abrasive and porcelain-earthenware industries. The potassium modulus for the porcelain-earthenware industry has been established in the ratio of 2:1. Feldspars as close as possible to pure potassium (with the modulus not less than 4:1 corresponding to 80% of the orthoclase component) are essential in several productions, particularly the production of high-voltage porcelain;
- potassium-sodium raw materials, with a potassium modulus of at least 0.9, are used in ceramic building materials;
- sodium raw materials with non-standardized potassium modulus are used in the glass industry, the production of enamels and products such as vitreous china;
- calcium feldspars represented by plagioclase of higher numbers have limited practical application, and their presence in feldspar concentrates is undesirable.

There are the following types of deposits in Ukraine:

1. Pegmatite deposits: Bilchakivske, Ustia village, Hruzlivetske, Lozuvatske, Volodymyrivske, Balka Velykoho Taboru;
2. Deposits of crystalline rocks: trachytes of the Verbova site, microgranodiorites of the Dubrynetske deposit;
3. Alkaline kaolins: Prosianivske, Pershozvanivske, Biliayivske, Katerynivske;
4. Multicomponent deposits (feldspar raw materials as a by-product): Bakhtyn (fluorite ores), Nosachivske (titanium-ilmenite ores), Perzhanske deposits of rare metals, Mazurivske (tantalum and niobium ores).

Currently, only the pegmatite deposit “Balka Velykoho Taboru” is being developed, and a special permit for the extraction of pegmatites from the “Hirne” deposit is invalid.

Feldspar raw materials were extracted from crystalline rocks - Dubrynytske deposit of microgranodiorite (Transcarpathian region), which occurs in the flysch rocks of the Carpathian Mountains in the form of a dyke-like body. The deposit was developed by OJSC “Steatyt”. Also, work was conducted to study trachytes of the Verbova site in the Telmanovo district of Donetsk region.

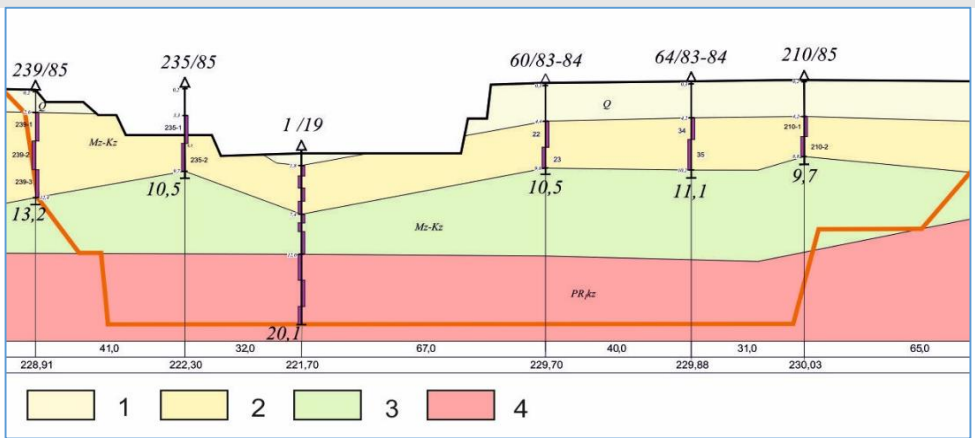

Figure 1 Schematic section of the Piatyrichka site of the Dubrivske deposit: 1 – sedimentary rocks (Q), 2 – alkaline kaolins (Mz-Kz), 3 – feldspar scree (Mz-Kz), 4 – feldspar crystalline rocks (granites, migmatites, plagiogranites, pegmatoid granites).

According to the analysis of feldspar raw material production, it is noted that the increase in feldspar raw material production is observed primarily in complex multicomponent deposits - the Piatyrichka section of the Dubrivske deposit and the Novakivska site of the Maidan-Vilske deposit, where alkaline kaolins, hard feldspar and feldspar crystalline rocks (granites, migmatites, plagiogranites, pegmatoid granites) are developed.

The most significant object of additional study of feldspar raw materials is the Piatyrichka site of the Dubrivske deposit, which is being exploited. The Piatyrichka site of the Dubrivske alkaline kaolin deposit is located at a distance of about 400 m north of Hlynianka village in the Baranivka district of Zhytomyr region

Conclusion

It is shown on the example of Ukrainian deposits of feldspar minerals that complex deposits with by-products become the main source for production. Especially if these are new mining operation facilities. The authors have identified three main types of such complex multicomponent deposits: 1) deposits of intrusive rocks where weathering crust of crystalline rocks are mined as a byproduct; 2) complex deposits, where feldspar rocks are enclosing or overburden and can also be considered as byproducts; 3) deposits where feldspar concentrate can be produced as a product of ore components processing.

The production of feldspar concentrates as by-products with ore processing of multicomponent deposits is one of the ways of increasing their profitability. This is due to the large production volume of feldspar products and an increase in raw material prices. The price of feldspar products is not as high as that of the main components - metals, fluorite, apatite, but the huge output of these products affects the final deposit value as well as the prices of the main components.